WHAT IS CLAIMED IS:

1. An apparatus for obtaining tomographic data of an object comprising:

- a divergent radiation source provided for emitting radiation centered around an axis of symmetry;

- a radiation detector comprising a two-dimensional array of line detectors, each having a detection-sensitive area directed towards the divergent radiation source and being provided for one-dimensional imaging of radiation entering said detection-sensitive area;

- a region arranged in the radiation path between said divergent radiation source and said radiation detector provided for housing said object; and

- a device provided for moving said divergent radiation source and said radiation detector relative said object, while each of said line detectors is adapted to record a plurality of line images of radiation as transmitted through said object, wherein:

- said divergent radiation source is provided for emitting radiation within a solid angle such that radiation is directed towards the full extension of said object at least in a first dimension, which is perpendicular to said axis of symmetry;

- the line detectors of said two-dimensional array of line detectors are sited in rows and columns , wherein the line detectors of each row are sited edge-to-edge along a line, and are of a number and have each a length such that they together define an opening angle large enough to detect said radiation

directed towards the full extension of said object in said first dimension; and

- said moving device is provided for moving said divergent radiation source and said radiation detector relative said object helically around a second axis being essentially perpendicular to said axis of symmetry and the direction of said first dimension, to obtain tomographic data of said object, wherein said helical movement includes a rotation less than essentially the sum of one full revolution and said opening angle, and a distance along said second axis corresponding to a distance between two adjacent detectors in a column of said two-dimensional array.

2. The apparatus of claim 1 wherein said rotation is essentially equal to the sum of one half revolution and said opening angle.

3. An apparatus for obtaining tomographic, tomosynthesis, and still picture data of an object comprising:

- a divergent radiation source provided for emitting radiation centered around an axis of symmetry;

- a radiation detector comprising a two-dimensional array of line detectors, each having a detection-sensitive area directed towards the divergent radiation source and being provided for one-dimensional imaging of radiation entering said detection-sensitive area;

- a region arranged in the radiation path between said divergent radiation source and said radiation detector provided for housing said object; and

- a device provided for moving said divergent radiation source and said radiation detector relative said object, while each of said line detectors is adapted to record a plurality of line images of radiation as transmitted through said object, wherein:

- said divergent radiation source is provided for emitting radiation within a solid angle such that radiation is directed towards the full extension of said object at least in a first dimension, which is perpendicular to said axis of symmetry;

- the line detectors of said two-dimensional array of line detectors are sited in rows and columns, wherein the line detectors of each row are sited edge-to-edge along a line, and are of a number and have each a length such that they are together capable of detecting said radiation directed towards the full extension of said object in said first dimension; and

- said moving device is provided for

  - moving said divergent radiation source and said radiation detector relative said object helically around a second axis being essentially perpendicular to said axis of symmetry and the direction of said first dimension, to obtain tomographic data of said object;

  - moving said divergent radiation source and said radiation detector relative said object linearly in a plane perpendicular to said axis of symmetry to obtain tomosynthesis data of said object; and

  - moving said divergent radiation source and said radiation detector relative said object linearly along said second axis a distance corresponding to a distance between two

adjacent detectors in a column of said two-dimensional array to obtain still picture data of said object.

4. The apparatus of claim 3 wherein said wherein said helical movement includes a rotation less than essentially the sum of one full revolution and said opening angle, and a distance along said second axis corresponding to a distance between two adjacent detectors in a column of said two-dimensional array.

5. The apparatus of claim 4 wherein said rotation is essentially equal to the sum of one half revolution and said opening angle.

6. The apparatus of claim 3 wherein said line detectors of said two-dimensional array are directed in directions, each of which defines a different angle with respect to said axis of symmetry.

7. The apparatus of claim 6 wherein the different angles are distributed over an angular range of at least 5°.

8. The apparatus of claim 6 wherein the different angles are distributed over an angular range of at least 15°.

9. The apparatus of claim 6 wherein the different angles are distributed over an angular range of at least 25°.

10. The apparatus of claim 3 wherein said moving device is provided for moving said divergent radiation source and said radiation detector relative said object along said second axis a distance corresponding to the full extension of said object in a second dimension, which is perpendicular to the direction of said first dimension and to said axis of symmetry, to obtain said tomosynthesis data of said object.

11. The apparatus of claim 3 wherein said moving device is provided for moving said divergent radiation source and said radiation detector relative said object rotationally around said second axis, to obtain tomosynthesis data of said object, wherein said helical movement includes a rotation less than essentially the sum of one half revolution and said opening angle.

12. The apparatus of claim 3 wherein said moving device is provided for moving said divergent radiation source and said radiation detector relative said object linearly along said second axis a distance longer than a distance between two adjacent detectors in a column of said two-dimensional array to obtain oversampled still picture data of said object.

13. The apparatus of claim 1 wherein

- said divergent radiation source is provided for emitting radiation within a solid angle such that radiation is directed towards the full extension of said object in a second dimension, which is perpendicular to said first dimension and to said axis of symmetry;

- the line detectors of each column are sited with a distance from each other and are of a number such that they are together capable of detecting said radiation directed towards the full extension of said object in said second dimension.

14. The apparatus of claim 3 wherein

- said divergent radiation source is provided for emitting radiation within a solid angle such that radiation is directed towards the full extension of said object in a second dimension, which is perpendicular to said first dimension and to said axis of symmetry;

- the line detectors of each column are sited with a distance from each other and are of a number such that they are together capable of detecting said radiation directed towards the full extension of said object in said second dimension.

15. The apparatus of claim 14 wherein the line detectors of each column are sited up against each other to provide a dense two-dimensional array of line detectors.

16. The apparatus of claim 1 wherein the full extension of said object in said first dimension measures at least 30 cm.

17. The apparatus of claim 1 wherein the full extension of said object in said first dimension measures at least 40 cm.

18. The apparatus of claim 1 wherein the full extension of said object in said first dimension measures at least 50 cm.

19. The apparatus of claim 1 wherein the full extension of said object in said first dimension corresponds to the distance from shoulder to shoulder of a human being.

20. The apparatus of claim 1 wherein said two-dimensional array of line detectors measures at least 50 cm x 25 cm.

21. The apparatus of claim 1 wherein said two-dimensional array of line detectors measures at least 75 cm x 40 cm.

22. The apparatus of claim 1 wherein said two-dimensional array of line detectors measures at least 100 cm x 50 cm.

23. The apparatus of claim 1 wherein each row of said two-dimensional array of line detectors comprises at least 5 line detectors.

24. The apparatus of claim 1 wherein each row of said two-dimensional array of line detectors comprises at least 10 line detectors.

25. The apparatus of claim 1 wherein each row of said two-dimensional array of line detectors comprises at least 20 line detectors.

26. The apparatus of claim 1 wherein each column of said two-dimensional array of line detectors comprises at least 25 line detectors.

27. The apparatus of claim 1 wherein each column of said two-dimensional array of line detectors comprises at least 50 line detectors.

28. The apparatus of claim 1 wherein each column of said two-dimensional array of line detectors comprises at least 100 line detectors.

29. The apparatus of claim 1 wherein said two-dimensional array of line detectors is curved.

30. The apparatus of claim 1 comprising a collimator arranged in the radiation path between said radiation source and said region, said collimator preventing radiation, which is not directed towards said line detectors, from impinging on said object, thereby reducing the radiation dose to said object.

31. The apparatus of claim 1 wherein said line detectors are each a detector, which is direction sensitive to avoid the need of a scattering rejection collimator in front the detector.

32. The apparatus of claim 1 wherein

- said divergent radiation source is an X-ray source; and

- said line detectors are each a gaseous-based ionization detector, wherein electrons freed as a result of ionization by radiation are accelerated in a direction essentially perpendicular to the direction of that radiation.

33. The apparatus of claim 32 wherein said gaseous-based ionization detector is an electron avalanche detector.

34. The apparatus of claim 31 wherein said line detectors are each a detector, which is capable of detecting along its complete length.

35. The apparatus of claim 1 wherein said line detectors are each any of a diode array, a semiconductor PIN-diode array, a scintillator-based array, a CCD array, a TFT- or CMOS-based detector, or a liquid detector.

36. The apparatus of claim 1 wherein said apparatus comprises any of a PET scanner, an ultrasound examination apparatus, and a SPECT scanner.

37. A method for obtaining tomographic data of an object comprising:

- emitting a divergent radiation beam centered around an axis of symmetry;

- passing said emitted radiation through said object; and

- detecting said emitted radiation as a plurality of line images after having passed through said object by a radiation detector comprising a two-dimensional array of line detectors, the line detectors being sited in rows and columns, wherein the line detectors of each row are sited edge-to-edge along a line, and each of said line detectors has a detection-sensitive area directed towards the divergent radiation source and is provided

for one-dimensional imaging of radiation entering said detection-sensitive area, while said divergent radiation source and said radiation detector are moved relative said object, wherein:

- said divergent radiation beam is passed through the full extension of said object at least in a first dimension, which is perpendicular to said axis of symmetry;

- radiation of said divergent radiation beam passed through the full extension of said object in said first dimension is detected by one of said rows of line detectors instantaneously; and

- said divergent radiation source and said radiation detector are moved relative said object helically around a second axis being essentially perpendicular to said axis of symmetry and the direction of said first dimension, while detecting by said radiation detector to obtain tomographic data of said object, wherein said helical movement includes a rotation less than essentially the sum of one full revolution and said opening angle, and a distance along said second axis corresponding to a distance between two adjacent detectors in a column of said two-dimensional array.

38. A method for obtaining tomographic, tomosynthesis, and still picture data of an object comprising:

- emitting a divergent radiation beam centered around an axis of symmetry;

- passing said emitted radiation through said object; and

- detecting said emitted radiation as a plurality of line images after having passed through said object by a radiation detector

comprising a two-dimensional array of line detectors, the line detectors being sited in rows and columns, wherein the line detectors of each row are sited edge-to-edge along a line, and each of said line detectors has a detection-sensitive area directed towards the divergent radiation source and is provided for one-dimensional imaging of radiation entering said detection-sensitive area, while said divergent radiation source and said radiation detector are moved relative said object, wherein:

- said divergent radiation beam is passed through the full extension of said object at least in a first dimension, which is perpendicular to said axis of symmetry;

- radiation of said divergent radiation beam passed through the full extension of said object in said first dimension is detected by one of said rows of line detectors instantaneously;

- said divergent radiation source and said radiation detector are moved relative said object helically around a second axis being essentially perpendicular to said axis of symmetry and the direction said first dimension, while detecting by said radiation detector, to obtain tomographic data of said object;

- said divergent radiation source and said radiation detector are moved relative said object linearly in a plane perpendicular to said axis of symmetry, while detecting by said radiation detector, to obtain tomosynthesis data of said object; and

- said divergent radiation source and said radiation detector are moved relative said object linearly along said second axis a distance corresponding to a distance between two adjacent detectors in a column of said two-dimensional array, while

detecting by said radiation detector, to obtain still picture data of said object.

39. An apparatus for obtaining tomographic and tomosynthesis data of an object comprising:

- a divergent radiation source provided for emitting radiation centered around an axis of symmetry;

- a radiation detector comprising a two-dimensional array of line detectors, each having a detection-sensitive area directed towards the divergent radiation source and being provided for one-dimensional imaging of radiation entering said detection-sensitive area;

- a region arranged in the radiation path between said divergent radiation source and said radiation detector provided for housing said object; and

- a device provided for moving said divergent radiation source and said radiation detector relative said object, while each of said line detectors is adapted to record a plurality of line images of radiation as transmitted through said object, wherein:

- said divergent radiation source is provided for emitting radiation within a solid angle such that radiation is directed towards the full extension of said object at least in a first dimension, which is perpendicular to said axis of symmetry;

- the line detectors of said two-dimensional array of line detectors are sited in rows and columns, wherein the line detectors of each row are sited edge-to-edge along a line, and are of a number and have each a length such that they are

together capable of detecting said radiation directed towards the full extension of said object in said first dimension; and

- said moving device is provided for

  - moving said divergent radiation source and said radiation detector relative said object helically around a second axis being essentially perpendicular to said axis of symmetry and the direction of said first dimension, to obtain tomographic data of said object; and

  - moving said divergent radiation source and said radiation detector relative said object linearly in a plane perpendicular to said axis of symmetry to obtain tomosynthesis data of said object.

40. An apparatus for obtaining tomographic and still picture data of an object comprising:

- a divergent radiation source provided for emitting radiation centered around an axis of symmetry;

- a radiation detector comprising a two-dimensional array of line detectors, each having a detection-sensitive area directed towards the divergent radiation source and being provided for one-dimensional imaging of radiation entering said detection-sensitive area;

- a region arranged in the radiation path between said divergent radiation source and said radiation detector provided for housing said object; and

- a device provided for moving said divergent radiation source and said radiation detector relative said object, while each of said line detectors is adapted to record a plurality of line

images of radiation as transmitted through said object, wherein:

- said divergent radiation source is provided for emitting radiation within a solid angle such that radiation is directed towards the full extension of said object at least in a first dimension, which is perpendicular to said axis of symmetry;

- the line detectors of said two-dimensional array of line detectors are sited in rows and columns, wherein the line detectors of each row are sited edge-to-edge along a line, and are of a number and have each a length such that they are together capable of detecting said radiation directed towards the full extension of said object in said first dimension; and

- said moving device is provided for

  - moving said divergent radiation source and said radiation detector relative said object helically around a second axis being essentially perpendicular to said axis of symmetry and the direction of said first dimension, to obtain tomographic data of said object; and

  - moving said divergent radiation source and said radiation detector relative said object linearly along said second axis a distance corresponding to a distance between two adjacent detectors in a column of said two-dimensional array to obtain still picture data of said object.

41. An apparatus for obtaining tomographic data of an object comprising:

- a divergent radiation source provided for emitting radiation centered around an axis of symmetry;

- a radiation detector comprising a two-dimensional array of line detectors, each having a detection-sensitive area directed towards the divergent radiation source and being provided for one-dimensional imaging of radiation entering said detection-sensitive area;

- a region arranged in the radiation path between said divergent radiation source and said radiation detector provided for housing said object; and

- a device provided for moving said divergent radiation source and said radiation detector relative said object, while each of said line detectors is adapted to record a plurality of line images of radiation as transmitted through said object, wherein:

- said divergent radiation source is provided for emitting radiation within a solid angle such that radiation is directed towards the full extension of said object at least in a first dimension, which is perpendicular to said axis of symmetry;

- the line detectors of said two-dimensional array of line detectors are sited in rows and columns , wherein the line detectors of each row are sited edge-to-edge along a line, and are of a number and have each a length such that they together define an opening angle large enough to detect said radiation directed towards the full extension of said object in said first dimension; and

- said moving device is provided for moving said divergent radiation source and said radiation detector relative said object helically around a second axis being essentially perpendicular to said axis of symmetry and the direction of said first dimension, to obtain tomographic data of said

object, wherein said helical movement includes a rotation of at least the sum of a half revolution and said opening angle, and a distance along said second axis corresponding at least to a distance between two adjacent detectors in a column of said two-dimensional array.

42. The apparatus of claim 1 wherein said helical movement includes a rotation of at least the sum of one full revolution and said opening angle.

43. The apparatus of claim 41 wherein said helical movement includes a rotation of at least the sum of two full revolutions and said opening angle.

44. The apparatus of claim 41 wherein said helical movement includes a rotation, which corresponds to a predetermined required spatial resolution in an image reconstructed from said tomographic data.